REMARKS

In view of the preceding amendments and the comments which follow, and pursuant to 37 C.F.R. § 1.111, amendment and reconsideration of the Official Action of June 7, 2005 is respectfully requested by Applicants.

Summary

Claims 1 – 9 stand rejected. Claims 1 and 9 have been amended. Claim 63 has been added. No new matter has been added as a result of these amendments. Claims 1 – 10 are pending following entry of the present remarks.

Claim Rejection under 35 USC §112

This Claim 9 rejection has been obviated by appropriate amendments, as required by the Examiner. Applicants have made this change solely to advance prosecution and do not believe that any substantive change has been made to the claim.

Accordingly, Applicants respectfully request that this claim rejection under 35 USC §112 be withdrawn.

Rejection of Claim under 35 USC §103

The Examiner has next rejected Claims 1 – 6, 8 and 9 under 35 U.S.C. § 103 (a) as being unpatentable over Murata et al. (Murata) (U.S. Patent 5,423,915) in view of Patrick (Patrick) (US 5,474,648). Although, Applicants traverse these rejections, Claim 1 has been amended to remove any ambiguities that may have been the basis for these rejections.

Claim 1 is directed to a plasma processing apparatus. The plasma processing apparatus comprises a plasma processing chamber having a plasma excitation electrode, a radiofrequency generator, a radiofrequency feeder, and a matching circuit.

Amended Claim 1 recites that the first series resonant frequency f_0 corresponds to a minimum impedance of the plasma processing chamber, evaluated with the plasma chamber disconnected from the plasma apparatus during a non-discharge period. Thus, the impedance characteristic of the plasma chamber, which represents a relationship

between the frequency of the radio waves supplied to the plasma chamber and the impedance of the plasma chamber, is measured during the non-discharge period. As such, the inherent series resonant frequencies of the plasma chamber are determined from this impedance characteristic. Further, the first series resonant frequency among the determined series resonant frequencies is appropriately and adequately adjusted with respect to the frequency of the power for plasma generation.

Accordingly, the first series resonant frequency is correlated to a minimum impedance of the plasma processing chamber and thus to the structure of the plasma processing chamber. This distinguishable claim 1 feature of the first series resonant frequency serves to improve uniformity of the plasma processing, to reduce power loss, etc., by adequately setting the resonant frequency of the equivalent radio frequency circuit, representing the plasma chamber, during the non-discharge period with respect to the frequency of the power supplied for plasma generation.

Murata and Patrick are both silent about this feature of Claim 1. The Examiner acknowledges that Murata teaches applying a frequency of 13.56 MHz to both the plasma processing chamber and the plasma excitation electrode, but does not teach or suggest a first series resonant frequency of the plasma chamber. In Patrick, the adjustment of the impedance of the radio frequency power is performed with respect to the input impedance of the plasma excitation electrode that changes in the process of the plasma treatment or generation so as to conduct impedance matching. Thus, Patrick does not teach or suggest that the impedance of the plasma chamber during the non-discharge period depends on the frequency and is adequately controllable.

Moreover, Claim 1 recites that a frequency which is three times the first series resonant frequency f_0 of the plasma processing chamber which is measured at the end of the radiofrequency feeder is larger than a power frequency f_e of the radiofrequency waves.

Murata and Patrick are both silent about this correlation between the first series resonant frequency f_0 and the power frequency f_e of the radiofrequency waves. This

distinguishable claimed feature enables a reduction in the power required to achieve the same processing rate in the plasma processing chamber (see page 18, lines 1 – 10 of the specification). Further, the planar uniformity of the formed layer and the layer characteristics as conventionally achieved can be reduced, saving energy and reducing operation costs. When applied to a deposition apparatus, the deposition rate, the uniformity in layer thickness, and the isolation voltage can all be improved.

Thus, Murata and Patrick, taken singly or in combination with each other, may not reject Claim 1. Accordingly, Claim 1 is allowable. Dependent Claims 2– 6, 8 and 9 are also allowable for at least the same reasons.

The Examiner has next rejected Claim 7 under 35 U.S.C. § 103 (a) as being unpatentable over Murata et al. (Murata) (U.S. Patent 5,423,915) and Patrick (Patrick) (US 5,474,648) in view of Stramke (US 4,645,981).

As discussed above, Murata and Patrick failed to reject Claim 1. Claim 7 is indirectly dependent on Claim 1. Thus, Murata and Patrick may not be properly combined with Stramke to reject Claim 7.

In regard to new Claim 63, the plasma processing apparatus comprises a plasma processing chamber having a plasma excitation electrode, a counter electrode, a shower plate disposed between the plasma excitation electrode and the counter electrode, a radiofrequency generator, a radiofrequency feeder, and a matching circuit.

This structure enables feeding of a gas into a chamber space of the plasma chamber through a number of holes in the shower plate. As such, when a substrate is placed on the counter electrode, radiofrequency voltage is applied to the plasma excitation electrode and the counter electrode from the radiofrequency generator, while a reaction gas is fed into a chamber space through a gas feeding tube and shower holes to generate a plasma, and plasma processing such as deposition or the like is performed on the substrate.

Murata and Patrick are both silent about a plasma processing chamber that has a shower plate disposed between the plasma excitation electrode and the counter electrode.

In addition, Claim 63 recites the distinguishable feature of Claim 1, which recites that the first series resonant frequency f_0 corresponds to a minimum impedance of the plasma processing chamber, with the minimum impedance evaluated with the plasma chamber disconnected from the plasma apparatus during a non-discharge period.

Thus, for at least these two distinguishable features, Claim 63 is allowable over Murata in view of Patrick. Claims 2 – 9, which are either directly or indirectly dependent on Claim 1, are also allowable for at least the same reasons.

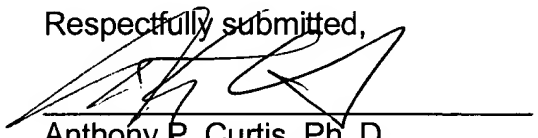
Applicants respectfully request that these rejections pursuant to 35 USC §103 be withdrawn.

Conclusion

Applicant respectfully submits that this application is in condition for allowance and such action is earnestly requested. Applicants believe a two-month extension is due. Applicants request that this paper constitutes any necessary petition and authorizes the Commissioner to charge any underpayment, or credit any overpayment, to Deposit Account No. 23-1925.

If for any reason, however, the Examiner feels that a telephone interview would be helpful in resolving any remaining issues the Examiner is respectfully requested to contact Applicant's undersigned attorney.

Respectfully submitted,



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